Amendment to the Claims

1-11 (canceled).

12. (currently amended) An apparatus for producing nitride films comprising:

(a) a pair of corona-discharge producing electrodes,

(b) a nitrogen delivery path leading to a nozzle at which the electrodes produce a corona discharge, ~~and~~

(c) means to locate a substrate along the nitrogen delivery path downstream of the location at which the electrodes produce the corona discharge for deposition thereon of nitrogen activated by the corona discharge at a location sufficiently distant from the corona-discharge producing electrodes such that essentially the only activated nitrogen impingent on the substrate is $N_2A^3\Sigma_u^+$, and

(d) the distance within the apparatus from the corona-discharge producing electrodes to the means to locate a substrate providing a transit time of the nitrogen traveling therebetween along the nitrogen delivery path exceeding the lifetime of activated nitrogen in states other than $N_2A^3\Sigma_u^+$, whereby those states are effectively filtered out of nitrogen reaching the location of the means to locate a substrate.

13. (previously presented) The apparatus according to claim 12, further comprising a nozzle with a nitrogen emersion orifice in the nitrogen delivery path, a first one of the corona-discharge electrodes being a cathode proximate the nitrogen emersion orifice of the nozzle, a second of the corona-discharge electrodes being spaced from the nitrogen emersion orifice of the nozzle and the first one of the corona-discharge electrodes, a skimmer located downstream of the nozzle in the direction of nitrogen flow, the skimmer defining an opening to collimate a beam of activated nitrogen molecules passing therethrough, at least one chamber downstream of the skimmer, means for evacuating the chamber to draw off gases other than the activated nitrogen molecules prior to the activated nitrogen molecules reaching the substrate.

14. (previously presented) The apparatus according to claim 13, wherein the at least one chamber comprises one of a plurality of at least two succeeding chambers with means for evacuating each of the succeeding chambers to draw off gases other than the activated nitrogen molecules passing therethrough towards the substrate, each succeeding chamber in the

direction of nitrogen flow being evacuated to a lower interior pressure, the last of the downstream chambers containing the means to locate a substrate and, in operation, containing at the location of the means to locate a substrate predominantly ground state N_2 molecules and $A^3\Sigma_u^+$ state metastable N_2 molecules, whereby the metastable N_2 molecules impacting a substrate deliver a single N atom, the further N atom of the N_2 pair carrying from the site of impact energy of reaction.

15. (previously presented) The apparatus according to claim 14, wherein the nozzle comprises a restricted end of a tube, the tube being in the nitrogen delivery path, the cathode being located within the tube, and the second of the corona discharge electrodes being electro-positive relative to the cathode and located outside the tube, the nitrogen emergent from the tube into a corona discharge between the electrodes forming with the corona discharge a corona discharge supersonic free-jet.

16. (original) The apparatus according to claim 15, wherein the second of the corona discharge electrodes is generally annular and surrounds the restricted end of the tube.

17. (original) The apparatus according to claim 15, wherein the second of the corona discharge electrodes is downstream of the restricted end of the tube in the direction of nitrogen flow.

18. (original) The apparatus according to claim 17, wherein the skimmer serves as the second of the corona discharge electrodes.

19-35. (cancelled).

36. (currently amended) Apparatus for producing a film on a semiconductor substrate comprising:

(a) means for establishing a vacuumized environment,

(b) means for establishing a corona discharge in the vacuumized environment,

(c) means for creating a flow of nitrogen gas into the corona discharge and a supersonic jet of diatomic, activated metastable nitrogen molecules from the corona discharge,

(d) means for collimating the jet of nitrogen molecules, ~~and~~

(e) means for locating a target semiconductor substrate in the path of the collimated jet of nitrogen particles at a distance from the means for establishing a corona discharge such that substantially only diatomic nitrogen molecules of the form $N_2A^3\Sigma_u^+$ and $N_2X^1\Sigma_g^+$ are present at that distance, and

(f) the distance within the apparatus form the corona-discharge producing electrodes to the means for locating a target semiconductor substrate providing a transit time of the nitrogen traveling therebetween in the collimated jet that exceeds the lifetime of activated nitrogen present in the jet in states other than $N_2A^3\Sigma_u^+$, whereby activated nitrogen in those states are effectively filtered out of the nitrogen present at the means for locating the target semiconductor substrate by their conversion to the $A^3\Sigma_u^+$ state.

37. (original) The apparatus according to claim 36, further comprising means for withdrawing background gases from around the collimated jet of nitrogen molecules.

38. (original) The apparatus according to claim 36, further comprising means for supplying a group III metal to react with the nitrogen molecules at a surface of the substrate to grow a group III metal nitride film on the surface.

39. (amended) The apparatus according to claim 36, further comprising:

~~(f)~~ (g) means for controlling the temperature of the substrate.

40. (previously presented) The apparatus according to claim 39, wherein the means for controlling the temperature comprises means for bringing the substrate to a temperature below 900° C.

41. (previously presented) The apparatus according to claim 36, further comprising a source of a reagent in addition to the nitrogen for delivering the reagent to the substrate with the metastable nitrogen molecules to form on the substrate a layer that is a nitride of the reagent.

42. (previously presented) The apparatus according to claim 12, further comprising at least one further corona-producing electrode and at least one further nitrogen delivery path to at least one further nozzle.

43. (previously presented) The apparatus according to claim 42, wherein the pair of corona discharge electrodes, the at least one further corona-producing electrode, and the nitrogen delivery paths are part of an array of multiple, activated nitrogen molecule plasma production means opening into a vacuumized chamber.

44. (previously presented) The apparatus according to claim 12, further comprising a source of nitrogen and argon in communication with the nitrogen delivery path, whereby a mixture of nitrogen and argon is delivered along the path to the substrate location.

45. (previously presented) The apparatus according to claim 14, wherein, in operation, the pressure in each succeeding chamber is 1/10 or less than the preceding chamber.

46. (previously presented) The apparatus according to claim 45, wherein, in operation, the first chamber, into which the nozzle opens has a pressure less than 10^{-6} Torr.

47. (amended) An apparatus for producing a dielectric insulator film comprising:

(a) at least one corona-discharge producing electrode pair,

(b) at least one source of a pressurized reagent gas,

(c) at least one path of reagent gas flow to at least one nozzle proximate the tip of one electrode of the at least one pair and in the region of corona discharge,

(d) a reduced pressure location at an outlet of the nozzle into which the reagent gas emerges as a supersonic jet of activated reagent molecules,

(e) a skimmer downstream of the nozzle in the direction of flow of the supersonic jet, ~~and~~

(f) a substrate location downstream of the skimmer, in operation locating a substrate for formation thereon a dielectric film composed at least in part of the reagent, and

(g) a supersonic jet expansion region between the skimmer and the substrate location of a length to effect filtering out of relatively short-lived excited states of the reagent gas moving in the supersonic jet toward the substrate location.

48. (previously presented) The apparatus according to claim 47, wherein the substrate location is at a distance downstream of the nozzle such that the activated reagent

molecules are substantially only ground state molecules and activated molecules of the $A^3\Sigma_u^+$ state.

49. (previously presented) The apparatus according to claim 48, wherein the at least one source of a pressurized reagent gas is a source of diatomic molecules of reagent gas, the activated molecules arriving at the substrate location are diatomic molecules of the $A^3\Sigma_u^+$ state.

50. (previously presented) The apparatus according to claim 47, wherein the at least one corona-discharge producing electrode pair comprises:

(i) a narrow-tipped, corona-producing cathode adapted to be electro-negatively energized, and

(ii) a broader surfaced anode adapted to be electro-positively energized relative to the cathode.

51. (previously presented) The apparatus according to claim 47, wherein the reagent gas comprises nitrogen and the dielectric film formed is an oxynitride.

52. (previously presented) The apparatus according to claim 51, wherein the substrate has a growing oxide layer exposed to the nitrogen for formation of the oxynitride film.